

one side; the Australian–New Zealand Shoveler (*rhyncobotis*) and the Blue-winged Teal (*discors*) on the other, greatly resemble each other in plumage pattern, so nearly that the closest relationship must be assumed”.

In our opinion it is questionable whether it is correct to assume a close relationship on the apparent presence or absence of a character (i.e. the white facial crescent), which we have now shown to be present but recessive, becoming a dominant recessive in hybrids involving Northern Shoveler, Red Shoveler and Cinnamon Teal.

*Summary:* A back-cross Northern Shoveler  $\times$  Cinnamon Teal  $\delta$   $\times$  Northern Shoveler  $\text{f}$  is described, in which characters of the Australasian Shoveler are revealed. The presence of a white neck ring also suggests a relationship with Mallard. Other hybrids within Delacour's group of “Blue-winged Duck” are discussed, and in their characters strongly support the hypothesis that this group has evolved as a single line within the genus *Anas* and with affinities to the Mallard.

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## Wintering of *Saxicola torquata* in the Algerian Sahara

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The object of this paper is to clarify the wintering status of the Stonechat *Saxicola torquata* in the northern and central Algerian Sahara and in the adjacent south-eastern corner of Morocco. This is considered in relation to the few scattered references in the literature and in the light of observations which I made during the winters of 1968, 1969 and 1971. On all occasions I was accompanied by my wife G. F. Johnson and, in 1968 and 1969 respectively, by C. G. Headlam and J. H. English.

*The literature:* Heim de Balsac & Mayaud (1962), summarizing the literature to that date, list the following winter records of stonechats within the Sahara:

- Touggourt, 33° 08' N., 6° 04' E. One on 14th December (Geyr von Schweppen-  
burg).  
60 km. south of Laghouat, 33° 16' N., 3° 00' E. No details given (Laenen & Niethammer).  
On the Oued Mya, south of Ouargla, 32° 00' N., 5° 16' E. One on 12th April (Hartert).  
Ain Taiba, 30° 20' N., 5° 45' E. One female shot on 2nd January (Geyr von Schweppen-  
burg).

Emphasizing the extreme rarity of such observations, they stress the importance of Hartert's record on the Oued Mya, although Geyr's Ain Taiba bird receives no similar comment.

Van Hecke (1965) discusses the recovery of a Dutch-ringed first year bird on 16th November, 1952 at Beuprêtre,  $32^{\circ} 20' N$ ;  $3^{\circ} 41' E$ ., to the south of Gardaia,  $32^{\circ} 30' N$ ;  $3^{\circ} 40' E$ ., where Gaston (1970) found a single stonechat on 1st February, 1968. Blondel (1962) records a sparse, predominantly male population at Djenien Bou Rezg,  $32^{\circ} 18' N$ ;  $0^{\circ} 48' W$ ., between 28th November 1960 and 28th February, 1961. Dupuy (1969), who ringed stonechats at Beni Abbes,  $30^{\circ} 11' N$ ;  $2^{\circ} 14' W$ ., in February 1965, suggests that this latitude corresponds to the southerly limit of the range of the species in the Sahara.

Smith (1965) states that in Morocco the stonechat is 'not rare along the Saharan fringe in winter, mostly in the larger river valleys, but at times in open desert with bushes . . .' He has kindly made available to me the whole of his relevant data which include the following records for the Sahara proper:

Figuig,  $32^{\circ} 10' N$ .,  $1^{\circ} 15' W$ .. One male on 8th February, 1963.

Bouanane,  $32^{\circ} 02' N$ .,  $3^{\circ} 02' W$ .. One male on 12th February, 1963.

In the Gorges du Ziz, between Ksar-es-souk,  $31^{\circ} 55' N$ .,  $4^{\circ} 26' W$ .. and Erfoud,  $31^{\circ} 25' N$ .,  $4^{\circ} 13' W$ .. Two on 21st November, 1963.

Merzouga,  $31^{\circ} 04' N$ .,  $3^{\circ} 59' W$ .. One on 22nd November, 1963.

*The Algerian Sabara*: In the region under discussion, the northern limit of the Sahara, as defined by Quézel (1965), closely follows the 100 mm. isohyet. It is represented approximately by a line following the southern edge of the Jbel Sarhro range of the Great Atlas foothills, joining Boudenib,  $31^{\circ} 55' N$ ;  $3^{\circ} 38' W$ ., Bechar,  $31^{\circ} 35' N$ ;  $2^{\circ} 17' W$ ., Figuig,  $32^{\circ} 10' N$ ;  $1^{\circ} 15' W$ ., Biskra,  $34^{\circ} 50' N$ ;  $5^{\circ} 40' E$ ., and Gafsa,  $34^{\circ} 28' N$ ;  $8^{\circ} 43' E$ ., and curving southward somewhat between Figuig and Biskra to include the Plateau des Daias well to the south of Laghouat (see map). It is in relation to this line that penetration by wintering stonechats should be assessed, rather than in terms of latitude alone. To the south of it the Sahara proper is composed of vast areas of stony desert (*hammada*) overlaid by the two irregular dune-sand (*erg*) masses of the Grands Ergs Occidental and Oriental. The oases are discussed below.

Separating the Sahara from the stonechat's coastal breeding and wintering area, within and to the north of the middle and Tellian Atlas mountains, is the 200 km. wide and 1,000 m. high mass of the combined Hauts Plateaux and the Plateau des Daias. This arid zone, with night temperatures regularly below freezing from December to February, supports a steppe vegetation of Halfa Grass *Stipa tenacissima* and *Artimesia herba-alba*. Its two parts are separated, in places to a height of an additional 1,000 m., by the Saharan Atlas Mountains.

*South-east Morocco*: The ill-defined Morocco-Algerian frontier encloses, between a little to the north of Bechar and a few kilometres to the south of Erfoud, a northward loop of the Saharan boundary. The western quarter of the Hauts Plateaux lies within Morocco. To the west of these areas the Atlas *massif* separates them from the broad Atlantic coastal plain where stonechats commonly breed and winter.

*Observations 1968-71*: Our itineraries were:

1968 (20th January-3rd March) Defilia, Bechar and along the Oued Saoura to Adrar and Reggane. Return along the same route, with excursion to Timimoun and departure via Ain Sefra.

1969 (21st January-11th February) Messaad, Aflou, Ain Sefra, Bechar and along the

Oued Saoura to Reggane. Return along the same route, with excursion to Timimoun and continuation to Biskra.

1971 (9th–28th February) Complete circuit of the Grand Erg Occidental, *via* Ain Sefra, Aflou, Laghouat, Gardaia, excursion to Ouargla, El Golea, Timinoun, the Oued Saoura, Bechar and Defilia.

The following observations were made:

Defilia,  $32^{\circ} 15' N.$ ,  $1^{\circ} 22' W.$  A pair and a single male in territories at the edge of the small palmery, and a further male among scrub bordering the *shott* 6 km. to the east, 21st to 23rd January, 1968.

Beni Abbes. Two pairs with regular territories at opposite ends of the palmery and a further one male and three females in gardens and on the desert fringes of the town, between 26th January and 23rd February, 1968. A pair in one of the palmery territories on 28th January, 1969 and a single male in the same territory on 21st February, 1971, when a second male occupied a small, very enclosed territory in the centre of the palmery.

Zaouira el Kbira,  $29^{\circ} 28' N.$ ,  $1^{\circ} 30' W.$  A pair in a clearing in the palmery on the outskirts of the village, 9th February, 1968.

Timimoun,  $29^{\circ} 15' N.$ ,  $0^{\circ} 15' E.$  A pair on the bluff above the town midden and a single male among the tamarisks at the foot of the palmery, 5th–8th February, 1968. A single male in the same territory as the pair, 3rd–4th February, 1969.

Ouargla. A pair at the eastern end of the causeway across the *shott*, with a territory defined by the causeway and the palm-frond fence of the waterside gardens, 14th February, 1971.

South of Ain Sefra,  $32^{\circ} 45' N.$ ,  $0^{\circ} 35' W.$  A single male among the scrub to the south of the town, where the steppe gives way to *hammada*, 24th January, 1969.

Additional observations were made within the Hauts Plateaux:

Near Aflou,  $34^{\circ} 08' N.$ ,  $2^{\circ} 03' E.$  A male with a well defined territory in an area of nomad cultivation surrounded by scrub and thistles, 11th February, 1971.

Messaad,  $34^{\circ} 11' N.$ ,  $3^{\circ} 31' E.$  A male in a derelict part of the palmery, 22nd January, 1969.

Zaatcha,  $34^{\circ} 48' N.$ ,  $5^{\circ} 35' E.$  A male in an open area of cultivation at the edge of the palmery, 10th February, 1969.

and by K. D. Smith (*in litt.*):

Berguent,  $34^{\circ} 02' N.$ ,  $2^{\circ} 02' W.$  "Rather sparse where there were bushes", 31st January, 1963.

Jenane Krater,  $33^{\circ} 31' N.$ ,  $1^{\circ} 56' W.$  A male on 4th February, 1963.

*Discussion:* Erfoud, Bouanane, Defilia, Figuig, Djenien Bou Rezg and Ain Sefra lie at the northern limit of the Sahara. The surrounding mountains and the mass of the Hauts Plateaux to the north bring extremely variable weather conditions throughout the winter months. This, and the frequent flooding of the local wadis due to precipitation and melting snow as far afield as the Middle and Great Atlas mountains, provide locally extensive areas of standing water. Insect life is abundant and the terrain topographically suited to stonechats. Merzouga is on one of several channels of the Oued Ziz, below where it emerges from its gorge on to the *hammada*.

Beni Abbes, Zaouira el Kbira, Timimoun, Beauprêtre, Gardaia and Touggourt are only six of many large oases, on the slopes of low escarpments and in shallow depressions, surrounding the Grand Erg Occidental and down the north-western edge of the Grand Erg Oriental. Watered by an unvarying abundance of spring water, from deposits mainly below the *erg*, they support large plantations of Date Palms *Phoenix dactylifera* in whose shade vegetables and cereals are cultivated. The salt marsh which forms at the lower edges of such palmeries is favourable to scattered clumps of *Ziziphus lotus* and belts of *Tamarix* spp., the former affording perches and the latter abundant insect food for wintering stonechats. Ouargla, in the intervening Oued Mya basin, is a large oasis bordering a permanent lake some



The principle features of the northern-central and northern Algerian Sahara, in relation to the Hauts Plateaux and the Atlas ranges. Sites of wintering Stonechats, *Saxicola torquata* are named in bold capitals. The unshaded area to the north of the Atlas Mountains is the fertile coastal plain and that to the south of the Hauts Plateaux is stony (*hammada*) desert. Unnamed circles represent wintering localities which are discussed in the text in relation to the nearest named town.

10 km. in length. Ain Taiba is a simple water-point 10 km. or more within the dunes of the Grand Erg Oriental.

The Hauts Plateaux offer negligible hospitality to wintering stonechats except at well watered places like Berguent at the northern edge, and such southerly pockets of nomad and permanent cultivation as are represented at Aflou, Messaad and Biskra which enjoy locally higher rainfall due to the proximity of mountains. Jenane Krater lies in a narrow zone which is notable for its scattered *daias*, shallow, moist depressions containing *Pistacia atlantica* to a height of 10 m., in association with *Ziziphus lotus* and a low ground cover of annual plants.

In addition to abundant food, all the above sites provide the physical and topographical requirements of a stonechat's winter territory as defined by Johnson (1971). The frequent occurrence of pairs, holding well defined

territories, indicates a simple extension of the wintering pattern of stonechats in western Europe, the Iberian Peninsula and coastal North Africa (Agatho 1961-62, Johnson 1961 and 1971 and Van Hecke 1965). K. D. Smith's data (*in litt.*) record substantial incursions from the main wintering population (within and to the north and west of the Atlas mountains), singly and in pairs, into the fertile upland valleys and gorges intersecting the southern slopes of the Atlas *massif* between Ksar-es-Souk and Quarzazate, 30° 55' N: 6° 54' W., and among the cultivation below the foothills at the western end of the Hauts Plateaux.

From my own observations, only two males were found to be in the advanced state of plumage associated with the dense wintering populations of the southern Iberian Peninsula (Johnson 1971). In common with other European passerine species, there is a suggestion of a correlation between the number of stonechats wintering in the Sahara and the early onset of cold weather in continental Europe. In view of the late date of 12th April, for Hartert's bird on the Oued Mya, the possibility of breeding cannot altogether be ruled out, as I have found newly hatched young, in north-east Morocco, on 30th March.

The regular pattern presented by these observations indicates that penetration of the western Sahara by the stonechat in winter is by no means as rare as was formerly supposed, to a distance of up to 500 km. from its northern edge. Moreover, with our knowledge of the winter behaviour and requirements of the species, it is reasonable to expect that stonechats will be found wintering in other, intervening oases and possibly in the belt of admirably suitable habitat which exists in the almost unbroken line of palm-eries still further south, between Adrar, 27° 52' N: 0° 17' W., and Reggane, 26° 43' N: 0° 10' E., although we have not yet seen them in the small area we have sampled. Heim de Balsac & Mayaud (1962) record one wintering European Stonechat *S. t. rubicola* in Senegal.

*Summary:* The wintering of stonechats *Saxicola torquata* in the northern and central Algerian Sahara, south-east Morocco and the Hauts Plateaux is discussed. A regular pattern of observations emerges along the northern limit of the Sahara and in the oases surrounding the Grand Erg Occidental and to the west of the Grand Erg Oriental; representing a penetration of up to 500 km. into the Sahara proper. Birds were frequently paired and holding winter territories.

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